ON THE SPECIES *FENESTELLA HOROLOGIA* BRETNALL AND *MINILYA DUPLARIS* CROCKFORD

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(Plate II)

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Synopsis

Taxonomic work has established the identity of *Fenestella horologia* and *Minilya duplaris*. This identity is discussed and the valid species *Fenestella horologia* is described.

INTRODUCTION

During the writer's work on the Permian Polyzoa of the Bowen Basin, similarities between the species *Fenestella horologia* and *Minilya duplaris* became increasingly evident. Both species were described first from the Permian of Western Australia.

Fenestella horologia Bretnall, 1926, is characterized by a single row of nodes placed on a carina, hour-glass shaped fenestrules and three zooecia per fenestrule, placed so that there is an aperture at the proximal and distal ends of the fenestrule on the dissepiment and one aperture at mid-length of the fenestrule.

Minilya duplaris Crockford, 1944*c*, the type species of *Minilya*, is characterized by the same features save for the presence of a double row of nodes on the branch. The nodes arise from a carina which zig-zags its way along the branch.

Crockford (1944*c*, p. 174) notes the difference in carinal appearance, for she states " This species (i.e. *Minilya duplaris*) is probably the same form described by Miss Hosking (1931) from the Wooramel River District as *Fenestella horologia* Bretnall, but it differs from *F. horologia* in having a double, instead of a single, row of nodes ".

The importance of the double row of nodes as a feature of generic significance has been queried by Elias and Condra (1957, p. 66). They produce a very thorough criticism of Crockford's diagnosis of *Minilya* and reduce the differences between her genus and *Fenestella* to one, the double or single row of nodes.

Shulga-Nesterenko (1941, pp. 49–51) described *Fenestella virgosa* Eichwald and its varieties. On *F. virgosa* var. *sparsituberculata* only one row of nodes is developed whereas on *F. virgosa* a double row of nodes is developed. This variation made the possibility of a single and double row of nodes being developed on the one zoarium appear very real. Recently, Campbell and Engel (1963, p. 67) described *Fenestella* sp. 1, from the Tournaisian Tulcumba Sandstone, New South Wales, which has both a single and double row of nodes developed. With this in mind and because Hosking (1931) had mistaken *Minilya duplaris* for *Fenestella horologia*, measurements of both species were tabulated and plates, as well as primary type material, were studied.

The measurements for both species appear below (Table 1). The figures used by Crockford (1944*c*, p. 181, Pl. 1, figs 6, 7) are reproduced (Pl. II, figs 1, 2) as they appear in the original plate. From Crockford's measurements and the figures the similarity between the two species can be observed.

Additional measurements have been made by the writer on primary types of both species and these are presented in brackets.

To determine the base shape of the zooecial chamber, serial sections were cut through *Fenestella horologia* and *Minilya duplaris* and camera lucida drawings made. Superposition of the drawings enabled the median plate in the centre of the branch to be related to the nodes on the obverse surface and the change in shape of the zooecial chamber could be studied (see Pl. II, figs 3–5). The relation of the nodes to the median plate on *Minilya duplaris* changes from branch to branch.

Because of the similarity between the species, a thorough study was made of all Western Australian material labelled *Fenestella horologia* or *Minilya duplaris*. The result was that two specimens were located having the measurements tabled and showing both the single and double row of nodes on the one branch.

Table 1

	Fenestella horologia Bretnall (Crockford, 1944*a*, 1944*c*)	*Minilya duplaris* Crockford (Crockford, 1944*c*)
Bw	0·29–0·38 mm.	(0·26) 0·33–0·41 mm.
B/10	18–22	16–19 (21)
F/10	16–18	14–17 (18)
Fl	0·29–0·52 mm.	0·4–0·51 mm.
Fw	0·17–0·4 mm.	0·14–0·25 (0·32) mm.
Z/10	37 (35–39)	33 (37)
Zd	0·08–0·13 mm.	0·13 mm.
Z/F	2–3	2–3
Z–Z	0·21–0·34 mm.	0·27–0·35 mm.
N–N	0·23–0·31 mm.	0·13–0·17 mm.
N/5	(16–21)	(30–38)
Dw	0·1–0·29 mm.	0·1–0·3 mm.
Zb	(T)	(T)

Bw=branch width, B/10=branches per 10 mm., F/10=fenestrules per 10 mm., Fl=fenestrule length, Fw=fenestrule width, Z/10=zooecia per 10 mm., Zd=zooecial diameter, Z/F=zooecia per fenestrule, Z–Z=separation of centres of successive zooecial apertures, N–N=separation of centres of successive nodes, N/5=nodes per 5 mm., Dw=dissepiment width, Zb=zooecial base shape, T=trapezoidal.

One specimen, F.17538 Australian Museum Collection, is labelled *Fenestella horologia* but for the most part it shows the double row of nodes of *Minilya duplaris*. Measurements made on the zoarium showing the double row of nodes agree with the measurements tabled previously (see Pl. II, fig. 6).

Of interest was the spacing of the nodes. On the portion of the zoarium where a double row of nodes is a constant feature, the spacing varied from 0·12 mm. to 0·17 mm. The spacing in the first appearance of a single row varied from 0·14 mm. to 0·17 mm. This was not into the spacing of *Fenestella horologia* but unfortunately the single row condition does not persist for more than three nodes before reverting to a double row condition and then to a single row condition of similar length with the nodes separated by 0·14 mm. to 0·2 mm.

Another observation which can be made is that the two cases of the single row have the same orientation with respect to a straight line, even though they are separated by an area showing the double row condition.

A second specimen, labelled C.P.C. 1287*c*, was assigned to *Minilya duplaris* by Crockford (1957, p. 67). This specimen likewise has both a single and double row of nodes developed (see Pl. II, fig. 7).

Clearly the two species are conspecific and therefore, because of priority, *Minilya duplaris* is invalid. As this is the type species of the genus *Minilya*, the genus is also invalid.

There are not many specimens of *Minilya amplia* Crockford, 1944*b*, available for study but it is felt that when additional specimens are found this species will be identical with a species of *Fenestella* having both a single and double row of nodes developed.

Systematic Description

Order Cryptostomata Shrubsole and Vine, 1882
Family Fenestellidae King, 1850
Genus Fenestella Lonsdale, 1839

Type Species.—(by subsequent designation of Riley, 1962, p. 76) *Fenestella subantiqua* d'Orbigny, 1850, p. 180, from the Silurian, Wenlockian, Wenlock Limestone, at Wren's Nest, Dudley, Worcestershire, England.

Diagnosis.—Zoarium fan or funnel shaped; zooecia in two rows on the branches, commonly increasing to three, proximal to bifurcation; rows of zooecia separated by a nodose carina on the obverse surface; reverse surface of varying ornamentation.

Fenestella horologia Bretnall, 1926

1926, *Fenestella horologia* Bretnall, p. 15, Pl. 1, fig. 6.
1929, *Fenestella parviuscula* Bassler, p. 76, Pl. ccxli, figs 8–13.
1931, ? *Fenestella parviuscula* Bassler; Martin, p. 391.
1931, *Fenestella horologia* Bretnall; Hosking, p. 13, Pl. 4, fig. 3.
1932, *Fenestella parviuscula* Bassler; Fritz, p. 99.
1936, *Fenestella pectinis* Moore (partim); Chapman; in Raggatt, p. 128 (fide Crockford, 1944*c*, p. 158).
1937, *Fenestrellina parviuscula* (Bassler); Elias, p. 314.
1943, *Fenestrellina horologia* (Bretnall); Crockford, p. 266.
1944*a*, *Fenestrellina horologia* (Bretnall); Crockford, p. 189, Pl. 1, fig. 1; Pl. 2, fig. A.
1944*b*, *Fenestrellina horologia* (Bretnall); Crockford, p. 158.
1944*c*, *Fenestrellina horologia* (Bretnall); Crockford, p. 167, Pl. 1, figs 3, 6.
1944*c*, *Minilya duplaris* Crockford, p. 173, Pl. 1, figs 5, 7; text-figs 1C, D.
1946, *Minilya duplaris* Crockford; Crockford, p. 132.
1951, cf. *Fenestella ivanovi* Shulga-Nesterenko, p. 100, Pl. 19, fig. 1; text-fig. 38.
1953, *Fenestrellina nodograciosa* Chronic; Chronic, in Newell, Chronic and Roberts, p. 111, Pl. 21, figs 4*a*, *b*.
1955, cf. *Fenestella donensis* Morozova, p. 27, Pl. 4, figs 2, 3; text-figs 5, 6.
1957, *Fenestella horologia* Bretnall; Crockford, p. 57.
1957, *Minilya duplaris* Crockford; Crockford, p. 67.
1957, *Minilia duplaris* [sic] Crockford; Elias and Condra, p. 65.
1957, *Fenestella parviuscula* Bassler; Elias and Condra, p. 108.
1961, *Fenestella nomatae* Sakagami, p. 34, Pl. 15, fig. 3; text-fig. 5.

Holotype.—Specimen 16, Western Australian Geological Survey Collection from the Gascoyne River District, Western Australia.

The label was lost; there are a number of specimens of the species on the block figured by Bretnall (1926, Pl. 3) (Crockford, 1944*a*, p. 190).

Neotype.—(chosen Crockford, 1944*a*, p. 190) No. 2/2405*c*, Western Australian Geological Survey Collection from the Permian, Sakmarian, Callytharra Formation, east of the Gascoyne-Wyndham River Junction, Western Australia.

Lat. 25°03′, Long. 115°33′, Glenburgh 1 : 250,000 Geological Series Sheet SG 50–6, at Fossil Hill, Fossil Hill Station, Western Australia (Crockford, 1944*a*, p. 190, Pl. 1, fig. 1). This specimen is presently housed at the Department of Geology and Geophysics, University of Sydney.

Diagnosis.—Species of *Fenestella* with hour-glass fenestrules, two or three zooecia per fenestrule ; the relationship between zooecia and dissepiments is stabilized ; nodes may be uniserial or biserial ; zooecial base shape trapezoidal.

Discussion.—Crockford (1944*a*, p. 190) states that the specimen chosen as neotype is part of a block from the Gascoyne River District which was used by Bretnall for his original description. The specimen is designated " neotype " because there is doubt whether it was a syntype.

The specimen chosen and figured by Crockford as neotype can be seen on one of Bretnall's plates (1926, Pl. 3). In the lower half of this plate, there is a figure " 1 " on its side and the neotype is half an inch from the lower right-hand corner of this figure.

As recently as 1964, Crespin (1964) quotes the type locality of the neotype as being between the top of the Lyons Series and the top of the Byro Series, Gascoyne River District, Carnarvon Basin, Western Australia. The stratigraphic thickness represented is of the order of 3,500 feet. Because of the uncertainty, an effort was made to obtain more information concerning the type locality and to quote it as accurately as possible. The locality given for the neotype is the result.

With reference to the Glenburgh 1 : 250,000 Sheet, some mention must be made regarding the type locality and the stratigraphic horizon. Although the Callytharra Formation is not shown as outcrop at Fossil Hill, M. A. Condon (pers. comm.) has assured the writer that the Formation is present at this locality.

Description.

Micrometric Formula

B/10	D/10	Z/5	N/5	Bw	Zd	Zb
18–22	15–18	17–20	17–21	0·3–0·38	0·08–0·13	T

The branches are not parallel and show a tendency to diverge. They are capped by a nodose carina. Proximal to bifurcation, the branch width may increase to 0·48 mm. ; distal to bifurcation, the branch assumes the usual proportions. The branches are of similar width to the fenestrules.

The fenestrules have a width of 0·17 mm. to 0·40 mm. and a length of 0·29 mm. to 0·52 mm. The fenestrules are hour-glass in shape because of the projection of the peristomes of the apertures into them.

The dissepiments vary in width from 0·10 mm. to 0·30 mm. Their width increases near the branch because an aperture is situated on the dissepiment. The dissepiments are perpendicular to the branches.

The zooecial apertures are in two rows, with the zooecia of one row alternating with those of the other. There are three zooecial apertures per fenestrule and in many cases two of them are partly or wholly situated on a dissepiment. The centres of the zooecial apertures are separated by 0·21 mm. to 0·34 mm. Well developed peristomes are evident on the apertures, more so on the side adjacent to the fenestrule than on the side adjacent to the carina.

Proximal to bifurcation, a third row of apertures is inserted but no case has been found of four rows of apertures. The third row of apertures is located distal to the bifurcation of the carina.

The carina is nodose and has one row of nodes developed which exhibit varying tendencies. They may be bifid or even trifid at their topmost extremity or they may not bifurcate. The centres of successive nodes are 0·23 mm. to 0·31 mm. apart.

The zooecial base shape in the upper portions of the chamber is triangular but at the base it is trapezoidal.

On the reverse surface both branches and dissepiments are rounded. Ornamentation of the outer layer consists of minute, randomly oriented nodes. The removal of this layer reveals longitudinal striations.

Remarks.—Species with similar meshwork formulae to *F. horologia* are *F. subquadratopora* Shulga-Nesterenko, 1952, and *F. subvischerensis* Shulga-Nesterenko, 1951. The former species has a different arrangement and spacing of the nodes, while the latter species has narrower branches and dissepiments and the hour-glass fenestrules are not well developed.

Fenestella girtyi (Elias), 1937, has similar dimensions to *F. horologia* but there is a difference in the base shape of the zooecial chamber and the relation between the apertures and the dissepiments is not well stabilized in *F. girtyi* whereas it is in *F. horologia.*

Fenestella vischerensis Nikiforova, 1938 (fide Shulga-Nesterenko, 1941), and *F. vischerensis* var. *baschkirica* Shulga-Nesterenko, 1941, have narrower dissepiments and branches, the latter feature being characteristic also of *F. microaperturata* Shulga-Nesterenko, 1941, and *F. microaperturata* var. *polaris* Shulga-Nesterenko, 1941. *F. microaperturata* also has a smaller zooecial diameter.

Range and Distribution.—Fenestella horologia Bretnall has been recorded previously from Western Australia (Bretnall, 1926 ; Crockford, 1951 ; Crockford, 1957). It ranges from the Callytharra Formation of Sakmarian age to the Liveringa Formation of Kungurian age.

As *F. parviuscula*, it has been recorded from the Bitaoeni and Basleo Beds of Timor. These are Artinskian-Kazanian in age ; as *F. nodograciosa* (Chronic), it has been recorded from the Upper Pennsylvanian of Peru, and as *F. nomatae* Sakagami, it occurs in the Upper Permian of Japan. From the Artinskian of Vancouver Island, Canada, it is listed as *F. parviuscula* Bassler by Fritz.

In Eastern Australia, Crockford (1943, 1946) has recorded the species from the Lake's Creek Quarry, east of Rockhampton, and from Consuelo Creek, south-west of Rolleston. During work by the writer on the Permian Polyzoa of the Bowen Basin, it has been recorded from the Artinskian Buffel Formation, south of Cracow, from the Yatton Limestone, north-west of Marlborough, and from the Artinskian Cattle Creek Formation in the Reid's Dome area, south-west of Rolleston.

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References

Bassler, R. S., 1929.—The Permian Bryozoa of Timor. *Paläont. Timor.* 16 : 37–90.

Bretnall, R. W., 1926.—Palaeontological contributions to the Geology of Western Australia, 7 (13) : Descriptions of some Western Australian Fossil Polyzoa. *Bull. geol. Surv. West. Aust.*, 88 : 7–33.

Campbell, K. S. W., and Engel, B. A., 1963.—The faunas of the Tournaisian Tulcumba Sandstone and its members in the Werrie and Belvue Synclines, New South Wales. *J. geol. Soc. Aust.*, 10 : 55–122.

Crespin, I., 1964.—Catalogue of type and figured specimens in Western Australia. Rep. Bur. Miner. Resour. Geol. Geophys. Aust., 71.

Crockford, J. M., 1943.—Permian Bryozoa from Eastern Australia, Part III : Batostomellidæ and Fenestrellindae from Queensland, New South Wales and Tasmania. *J. Proc. r. Soc. N.S.W.*, 76 : 258–267.

————, 1944*a*.—A revision of some previously described species of Bryozoa from the Upper Palaeozoic of Western Australia. *J. Proc. R. Soc. West. Aust.*, 28 : 187–199.

Crockford, J. M., 1944*b*.—Bryozoa from the Permian of Western Australia, Part I: Cyclostomata and Cryptostomata from the North-West Basin and Kimberley District. Proc. Linn. Soc. N.S.W., 69 : 139–175.
————, 1944*c*.—Bryozoa from the Wandagee and Noonkanbah Series (Permian) of Western Australia. *J. Proc. R. Soc. West. Aust.*, 28 : 165–185.
————, 1946.—A bryozoan fauna from the Lake's Creek Quarry, Rockhampton, Queensland. Proc. Linn. Soc. N.S.W., 70 : 125–134.
————, 1951.—The development of bryozoan faunas in the Upper Palaeozoic of Australia. *Ibid.*, 76 : 105–122.
————, 1957.—Permian Bryozoa from the Fitzroy Basin, Western Australia. Bull. Bur. Miner. Resour. Geol. Geophys. Aust., 34.
Elias, M. K., 1937.—Stratigraphic significance of some Late Palaeozoic Fenestrate Bryozoans. *J. Paleont.*, 11 : 306–334.
————, and Condra, G. E., 1957.—*Fenestella* in the Permian of West Texas. *Mem. geol. Soc. Am.*, 70.
Fritz, M. A., 1932.—Permian Bryozoa from Vancouver Island. *Trans. r. Soc. Can.*, Ser. 3, 26 : 93–110.
Hosking, L. F. V., 1931.—Fossils from the Wooramel District, Western Australia. *J. Proc. r. Soc. West. Aust.*, 27 : 7–52.
Martin, R., 1931.—De Palaeontologie en Stratigraphie van Nederlandsch Oost-Indie : Bryozoa. *Leid. geol. Meded.*, 5 : 390–395.
Morozova, I. P., 1955.—Carboniferous Bryozoa of the Middle Don Basin. *Trudy paleont. Inst.*, 58.
Newell, N. D., Chronic, J., and Roberts, T., 1953.—Upper Palaeozoic of Peru. *Mem. geol. Soc. Am.*, 58.
Raggatt, H. G., 1936.—Geology of the North-West Basin, Western Australia, with particular reference to the stratigraphy of the Permo-Carboniferous. *J. Proc. r. Soc. N.S.W.*, 70 : 100–174.
Riley, N. D., 1962.—Opinion 622 : *Fenestella* Lonsdale, 1839 (Class Bryozoa) : Validation under the Plenary Powers in accordance with the accustomed usage. *Bull. zool. Nom.*, 19 : 76–79.
Sakagami, S., 1961.—Japanese Permian Bryozoa. Spec. Pap. Palaeont. Soc. Japan, 7.
Shulga-Nesterenko, M. I., 1941.—Lower Permian Bryozoa of the Urals. *Paleontologiya SSSR*, 5 (5) : 1.
————, 1951.—Carboniferous Fenestellids from the Russian Platform. *Trudy paleont. Inst.*, 32.
————, 1952.—New Permian Bryozoa from the Uralian Region. *Ibid.*, 37.
————, 1955.—Carboniferous Bryozoa of the Russian Platform. *Ibid.*, 57.

EXPLANATION OF PLATE II

Fig. 1. *Fenestella horologia* Bretnall ; reproduced from Crockford, 1944*c*, Pl. 1, fig. 6. (nodes retouched). ×20.

Fig. 2. *Minilya duplaris* Crockford ; holotype, reproduced from Crockford, 1944*c*, Pl. 1, fig. 7. (nodes retouched). ×20.

Fig. 3. Camera lucida drawing of *Fenestella horologia* Bretnall to show relation of nodes, median plate and apertures. ×25.

Fig. 4. *Fenestella horologia* Bretnall ; camera lucida drawing to show the shape of the zooecial base chamber and relation to apertures. ×25.

Fig. 5. Camera lucida drawing of *Minilya duplaris* Crockford to show the relation of nodes, median plate and apertures. ×25.

Fig. 6. *Fenestella horologia* Bretnall ; specimen F.17538, Aust. Mus. Collection, showing uniserial and biserial arrangement of nodes (retouched). ×25.

Fig. 7. *Minilya duplaris* Crockford ; specimen C.P.C. 1287c showing uniserial and biserial arrangement of nodes (nodes retouched). ×20.